1 4 3

Journal of MOLECULAR BIOLOGY

EDITOR-IN-CHIEF
J. C. KENDREW

ASSISTANT EDITOR
S. BRENNER

EDITORIAL BOARD
D. Baltimore
D. Branton
J. Cairns
G. N. Cohen
D. M. Crothers
J. E. Darnell
W. F. Dove
G. von Ehrenstein
G. Felsenfeld
W. Gilbert
J. Hurwitz
A. Klug
D. E. Koshland
D. C. Phillips
L. Stryer
A. Tissières
G. M. Tomkins
P. M. B. Walker
J. Wyman

OCT 17 11 12 AM '72
UNIVERSITY OF HAWAII
LIBRARY

VOLUME 64
28 February 1972 to 14 March 1972

ACADEMIC PRESS
LONDON and NEW YORK

Copyright © 1972, by Academic Press Inc. (London) Ltd.

ALL RIGHTS RESERVED

No part of this volume may be reproduced in any form, by photostat, microfilm, or any other means, without written permission from the publishers.

Printed in Great Britain

CONTENTS OF VOLUME 64

NUMBER 1, 28 FEBRUARY 1972

KLEIMAN, L. and HUANG, R. C. C., Reconstitution of Chromatin. The Sequential Binding of Histones to DNA in the Presence of Salt and Urea . . . 1

DUBNAU, D. and CIRIGLIANO, C., Fate of Transforming DNA following Uptake by Competent *Bacillus subtilis*. III. Formation and Properties of Products Isolated from Transformed Cells which are Derived Entirely from Donor DNA 9

DUBNAU, D. and CIRIGLIANO, C., Fate of Transforming DNA following Uptake by Competent *Bacillus subtilis*. IV. The Endwise Attachment and Uptake of Transforming DNA 31

LARK, K. G., Evidence for the Direct Involvement of RNA in the Initiation of DNA Replication in *Escherichia coli* 15T⁻ 47

SUGINO, A. and OKAZAKI, R., Mechanism of DNA Chain Growth. VII. Direction and Rate of Growth of T4 Nascent Short DNA Chains 61

LING, V., Fractionation and Sequences of the Large Pyrimidine Oligonucleotides from Bacteriophage fd DNA 87

KRAM, R., BOTCHAN, M. and HEARST, J. E., Arrangement of the Highly Reiterated DNA Sequences in the Centric Heterochromatin of *Drosophila melanogaster* Evidence for Interspersed Spacer DNA 103

BISWAS, D. K. and GORINI, L., Restriction, De-restriction and Mistranslation in Missense Suppression. Ribosomal Discrimination of Transfer RNA's . 119

ISHIKAWA, H. and NEWBURGH, R. W., Studies of the Thermal Conversion of 28 s RNA of *Galleria mellonella* (L.) to an 18 s Product . . . 135

HOLMQUIST, R., CANTOR, C. and JUKES, T. H., Improved Procedures for Comparing Homologous Sequences in Molecules of Proteins and Nucleic Acids 145

JUKES, T. H. and HOLMQUIST, R., Estimation of Evolutionary Changes in Certain Homologous Polypeptide Chains 163

Appendix 178

JOBE, A., RIGGS, A. D. and BOURGEOIS, S., *lac* Repressor–Operator Interaction. V. Characterization of Super- and Pseudo-wild-type Repressors . . 181

FUNATSU, G., NIERHAUS, K. and WITTMANN-LIEBOLD, B., Ribosomal Proteins. XXII. Studies on the Altered Protein S5 from a Spectinomycin-resistant Mutant of *Escherichia coli* 201

WU, J-R., HURN, J. and BONNER, J., Size and Distribution of the Repetitive Segments of the *Drosophila* Genome 211

RENNEBOOG-SQUILBIN, C., Conformational Study of the Human Immunoglobulin G1 Hinge Peptide 221

ROSSMANN, M. G., FORD, G. C., WATSON, H. C. and BANASZAK, L. J., Molecular Symmetry of Glyceraldehyde-3-phosphate Dehydrogenase . . . 237

Appendix—ROSSMANN, M. G., Locked Rotation Function . . . 246

ASAKURA, S. and IINO, T., Polymorphism of *Salmonella* Flagella as investigated by means of *in vitro* Copolymerization of Flagellins derived from Various Strains 251

LUZZATI, V., TARDIEU, A. and TAUPIN, D., A Pattern-recognition Approach to the Phase Problem: Application to the X-ray Diffraction Study of Biological Membranes and Model Systems 269

DELK, A. S. and DEKKER, C. A., Characterization of Rhapidosomes of *Saprospira grandis* 287

LETTERS TO THE EDITOR—

SLOBIN, L. I., Use of Bifunctional Imidoesters in the Study of Ribosome Topography 297

GREEN, M. and HODAP M., Asymmetric Transcription of Early Adenovirus Genes by the *Escherichia coli* RNA Polymerase *in vitro*. . . . 305

CAPASSO, S., GIORDANO, F., MAZZARELLA, L. and RIPAMONTI, A., Preliminary X-ray Investigation of Bovine Seminal Ribonuclease . . . 311

ROBBERSON, D., ALONI, Y., ATTARDI, G. and DAVIDSON, N., Expression of the Mitochondrial Genome in HeLa Cells. VIII. The Relative Position of Ribosomal RNA Genes in Mitochondrial DNA . . . 313

NUMBER 2, 14 MARCH 1972

DENNEY, R. M. and YANOFSKY, C., Detection of Tryptophan Messenger RNA in Several Bacterial Species and Examination of the Properties of Heterologous DNA–RNA Hybrids 319

ER-EL, Z., SHAKLAI, N. and DANIEL, E., Oxygen Binding Properties of Haemocyanin from *Levantina hierosolima* 341

SHIH, D., LANE, L. C. and KAESBERG, P., Origin of the Small Component of Brome Mosaic Virus RNA 353

NAKANISHI, M., TSUBOI, M., IKEGAMI, A. and KANEHISA, M., Fluctuation of an α-Helix Structure. Difference between the Central and Terminal Portions 363

KERBIRIOU, D. and HERVÉ, G., Biosynthesis of an Aspartate Transcarbamylase Lacking Co-operative Interactions. I. Disconnection of Homotropic and Heterotropic Interactions under the Influence of 2-Thiouracil . . . 379

STEIN, G. H. and HANAWALT, P. C., Initiation of the DNA Replication Cycle in *Escherichia coli*: Linkage of Origin Daughter DNA to Parental DNA? . 393

JONES, T. C. and DOVE, W. F., Photosensitization of Transcription by Bromodeoxyuridine Substitution 409

MCLACHLAN, A. D., Repeating Sequences and Gene Duplication in Proteins . 417
Appendix—Substitution Frequencies in Proteins 434

OBEL, J. and FREIFELDER, D., The Termini of Bacteriophage T7 DNA . . 439

MATHEWS, F. S., LEVINE, M. and ARGOS, P., Three-dimensional Fourier Synthesis of Calf Liver Cytochrome b_5 at 2·8 Å Resolution . . . 449

PICA-MATTOCCIA, L. and ATTARDI, G., Expression of the Mitochondrial Genome in HeLa Cells. IX. Replication of Mitochondrial DNA in Relationship to the Cell Cycle in HeLa Cells 465

REICHLIN, M., Localizing Antigenic Determinants in Human Haemoglobin with Mutants: Molecular Correlations of Immunological Tolerance . . . 485

FERSHT, A. R., Conformational Equilibria in α- and δ-Chymotrypsin. The Energetics and Importance of the Salt Bridge 497

LETTERS TO THE EDITOR—

WHITE, J. P., KUNTZ, I. D. and CANTOR, C. R., Studies on the Hydration of *Escherichia coli* Ribosomes by Nuclear Magnetic Resonance . . 511

NATHANS, D. and DANNA, K. J., Studies of SV40 DNA. III. Differences in DNA from Various Strains of SV40 515

NUMBER 3, 14 MARCH 1972

WAKE, R. G., KAISER, A. D. and INMAN, R. B., Isolation and Structure of Phage λ Head-mutant DNA 519

SKALKA, A., POONIAN, M. and BARTL, P., Concatemers in DNA Replication: Electron Microscopic Studies of Partially Denatured Intracellular Lambda DNA 541

CASJENS, S., HOHN, T. and KAISER, A. D., Head Assembly Steps controlled by Genes *F* and *W* in Bacteriophage λ 551

DUFFY, J. J., CHANEY, S. G. and BOYER, P. D., Incorporation of Water Oxygens into Intracellular Nucleotides and RNA. I. Predominantly Non-hydrolytic RNA Turnover in *Bacillus subtilis* 565

CHANEY, S. G. and BOYER, P. D., Incorporation of Water Oxygens into Intracellular Nucleotides and RNA. II. Predominantly Hydrolytic RNA Turnover in *Escherichia coli* 581

CHAMBERLAIN, J. P. and METZ, C. B., Mitochondrial RNA Synthesis in Sea Urchin Embryos 593

NIYOGI, S. K., Effect of Sigma Factor and Oligoribonucleotides on the Transcription of Well-defined Templates with the Ribonucleic acid Polymerase of *Escherichia coli* 609

FURUICHI, Y. and MIURA, K., The 3′-Termini of the Genome RNA Segments of Silkworm Cytoplasmic Polyhedrosis Virus 619

NORRIS, T. E. and KOCH, A. L., Effect of Growth Rate on the Relative Rates of Synthesis of Messenger, Ribosomal and Transfer RNA in *Escherichia coli* 633

STONE, K. R. and CUMMINGS, D. J., Comparison of the Internal Proteins of the T-even Bacteriophages 651

DEGNEN, S. T. and NEWTON, A., Chromosome Replication during Development in *Caulobacter crescentus* 671

ZELLWEGER, A., RYSER, U. and BRAUN, R., Ribosomal Genes of *Physarum*: Their Isolation and Replication in the Mitotic Cycle 681

LETTER TO THE EDITOR—

EAGLES, P. A. M. and JOHNSON, L. N., Electron Microscopy of Phosphorylase *b* Crystals 693